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# IMPORTANCE OF ON-SITE EMERGENCY PLAN IN CHEMICAL INDUSTRIES – AN OVERVIEW

KEYWORDS: Emergency, On-site emergency plan, emergency preparedness, hazardous process,

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**ABSTRACT**

*– Safety is an embedded process in the contemporary business scenario. It is an integral part of the business and not an isolated indicator. Unlike prior to 1980, Safety assumes more importance in the light of statutory requirements aiming to secure the life of the employees and to protect the community and the environment where the business is operated. Post Bhopal gas tragedy, more thrust and seriousness put in to manage the emergency situations arise in the Chemical Manufacturing Industries and thus the concept of On-site Emergency Plan came into vogue by amending the Factories Act, 1948. The trigger for the amendment was based on the Supreme Court direction in the matter of M/S. Sriram Foods and Fertilizers Vs the Govt. of India. The apex court urged the government to make some important amendments to the Factories Act 1948 in the year 1987 with incorporation of special provisions relating to hazardous process. Accordingly, the Factories Act has been amended with a new provision of Sec 41B (4) emphasizing that every occupier shall, with the approval of the Chief Inspector of Factories, draw up an On-site Emergency Plan and detailed disaster control measures for his factory and make known to the workers employed therein and to the general public living in the vicinity of the factory the safety measures required to be taken in the event of an accident taking place. Similar thrust was given under provision of Rule 13 of the Manufacture, Storage and Import of Hazardous Chemicals Rules 1989 also. The key deliverables of the On-site Emergency Plan is to prevent the emergency turning into a disaster, to ensure synchronized action from all the coordinating agencies with least possible delay in order to minimize damages to the property, people and environment and also to carryout effective rescue operation and treatment of the causalities. In this context, this paper discusses how Onsite Emergency Plan, being a critical process, plays a major role during emergency situation arise out in the course of operations, projects and maintenance in Chemical Industries.*

## AIM

To accentuate the importance of On-Site Emergency Plan during emergency situations arise out in the course of operations, projects and maintenance in Chemical Industries.

## METHODOLOGY

The study conducted -

i. Based on the field visit in Tanfac Industries Limited, Cuddalore, a chemical industry to understand the method of implementation over there;
ii. By reviewing literatures pertaining to the subject.

## DISCUSSION

### Emergency

An emergency is defined as an accident/incident that has potential to cause serious injuries or loss of life, extensive damage to property and serious disruption both in production and working of Industry and probably has an adverse impact on the environment/surroundings.

### Inducing Factors for Emergency

The following factors may cause major emergency,

- Plant failure.
- Human error.
- Vehicle cras
- Sabotage.
- Natural calamities.
- Fire hazards.

### On-Site Emergency

If an accident/incident occurs in an Industry, its impact is confined or restricted to the Industry premises, involving only its employees and the property within is termed as On-On-Site Emergency.

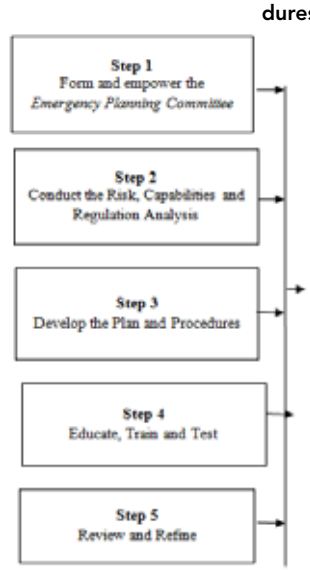
### On-Site Emergency Plan

It is a systematic plan or procedure which is designed to control emergency situations so as to provide safety and security to the stakeholders until the business continuity or normal business plan resumes.

It consists of two sections:\

- Emergency Plans.
- Emergency Procedures.

**Development of Emergency Plan and Emergency Procedures**



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**On-Site Emergency Plan should contain**

1. Site plan and topographic plan.
2. Plan showing the firefighting facilities.
3. Plan showing hazardous material storage area.
4. Material safety data sheets (MSDS) for hazardous chemicals.
5. Facilities available in main control center.
6. List of emergency equipment.
7. List of Safety Equipment.
8. List of important telephone numbers and addresses of -

i. Nearest hospitals and ambulance service center.
ii. Key Personnel of the unit.
iii. Nearest fire station.
iv. Govt. Officials.
v. Transport provider.
vi. Key Personnel of nearby industries.

**Emergency Planning Committee (EPC)**

EPC is a cooperative and consultative group who should represent the full range of stakeholders in a facility and will comprise of senior management, staff (union and non-union), Process Engineers, Maintenance Engineers of Civil, Electrical and Mechanical departments, HR Manager, Safety Officer and the Factory Medical Officer.

**Objectives of Emergency Plan**

The main objectives of Emergency Plan are,

- To control and contain the incident and if possible, try to eliminate it.
- To minimize the impact of the incident on persons, property and environment.

**Statutory Provision**

Post Bhopal gas tragedy (1984) followed by Supreme Court direction in the matter of M/S. Sriram Foods and Fertilizers versus Govt. of India, some important amendments have been made in the Factories Act 1948 in the year 1987 incorporating special provisions relating to hazardous process.

Under Section 41(B) (4) every Occupier is to prepare On-site Emergency Plan and detailed disaster control measures for his factory. Again under provision of Rule 13 of the Manufacture, Storage and Import of Hazardous Chemicals Rules 1989, it was urged that the occupier shall prepare and keep up to date On-Site Emergency plan containing details how major accidents will be dealt with on the site on which the industrial activity is carried on and that plan shall include the name of the persons who is responsible for safety on the site and names of those who are authorized to take action in accordance with the plan in case of emergency.

Preparation of On-Site Emergency Plan by the occupier is mandatory. The occupier shall ensure a mock drill of the On-Site emergency plan is conducted at least one in every six months. A detailed report of the mock drill conducted under rule shall be made immediately available to the Inspector and Chief Inspector of the Factories.

**Main Elements for designing On-Site Emergency Plan**

The main elements for designing On-Site Emergency Plan are,

- Leadership and administration.
- Role and responsibilities of Key Personnel.
- Emergency action.
- Proper warning alarms.
- Source of energy control.
- Protective and rescue equipment.
- Communication.
- Medical care.
- Mutual Aid.
- Public relation.
- Protection of vital records.
- Training.
- Periodical revision of plan.

**Emergency Action Plan**

The Action Plan should consist of the following:

- Emergency Control Room
- Key Personnel

**Emergency Control Room (ECR)**

This is the main room from where the operations to handle the emergency are directed and coordinated accordingly to all the key personnel.

Facilities to be made available in the Emergency Control Room are:

- Rapid Internal and External Communication.
- Computer data regarding the emergency plan and Other Essential Records.
- Daily Attendance of Workmen employed in the Industry.
- Records which contains Manufacturing and Storage of Hazardous Material of that respective Industry.
- Pollution Records.
- Walky-talky for faster internal communication.
- Plan of the plant showing-

1. Hazardous chemicals and Materials storage area.
2. Availability of different Safety Equipment at respective areas.
3. Fire Fighting System and Additional Source of water.
4. Site Entrance, Roadway and Emergency Exit.
5. Assembly Points.
6. Truck Parking Area.
7. Surrounding Locations.

- Stationery materials.
- List of Key Personnel with Addresses, Telephone Number etc…, both On-Site and Off-Site.

**Key Personnel for On-Site Emergency**

1. Works Main Controller.
2. Works Incident Controller.
3. Other Key Officers,

a. Communication Officer.
b. Security and Fire Officer.
c. Medical Officer.
d. Personnel/Administrative Officer.
e. Essential Work Team Members.

**Works Main Controller**

The General Manager of the Plant or the Safety Officer should act as Main Controller. His duties are to -

1. Assess the magnitude of the situation and decide whether the evacuation of staff from the plant is needed.
2. Declare emergency and will instruct gate office to operate the emergency siren after assessing the nature of the situation.
3. Exercise and direct operational control over areas other than those affected.
4. Maintain a continuous review of possible development

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and assess in consultation with Work Incident Controller and Other Key Personnel.
5. Liaison with Police, Fire Service, Medical Service, Factory Inspectorate and other Govt. Agencies.
6. Direct and control rehabilitation of affected areas after emergency.
7. Intimate Off-Site Emergency controller if the emergency spreads beyond the Industry premises and likely to affect the surrounding area.
8. Ensure that evidence is preserved for enquiries to be conducted by statutory authorities.

**Works Incident Controller**

He is the next responsible officer after the Works Main Controller. Generally the Plant Manager is designated as Works Incident Controller. In case of emergency he will-

1. Rush to the place of occurrence and take total charge and report to the Works Main Controller by personnel communication system like cell phones/walky-talky and inform about the magnitude of emergency.
2. Assess the situation and considering the magnitude of emergency he will take decision whether to inform Communication Officer to communicate the news of emergency to different agencies.
3. Take initiations to stop all operations within the affected area.
4. Take the charge of Main Controller till the Main Controller arrives.
5. Order for shutdown and evacuation of workers and staffs from affected area.
6. Inform all Key Personnel and all outside agency for help, as applicable.
7. Inform security and fire officers and State Fire Services.
8. Ensure that all non-essential workers/staff are evacuated to assembly point and areas searched for casualties.
9. Report all the significant information and development to Communication Officer. Moreover he will advise to preserve the evidence of emergency into the cause of emergency.

**Other Key Personnel and their duties**

**1. Communication Officer**

- On hearing the emergency siren/ alarm he will proceed to the control room and communicate to Works Incident Controller.
- He will collect information of the affected area. He will maintain a log book of incident.
- He will contact all essential departments and especially takes stock of the meteorological condition from local meteorological Department.
- He will communicate all information as directed by Works Main Controller /Works Incident Controller.

**2. Security and Fire Officer**

- The Security or Fire officer will be responsible for the firefighting.

- On hearing the emergency alarm/siren, he will reach the incident area with fire and security staff.
- Immediately after arrival to the emergency area, he will inform through telephone or walky-talky to the communication officer.
- He will inform to the Works Incident Controller about the situation and requirement of outside help like State Fire Service and other mutual aid members.
- At the site, the entire fire squad member will respond to the advice and information given by the Works Incident controller.
- The security will control the visitors and the vehicle entry.

**3. Medical Officer**

- Medical Officer with his team will report to the Works Incident Controller on hearing the fire/emergency siren immediately.
- The ambulance will be parked nearest to the site of incident. Name of injured and other casualties carried to the Hospital will be recorded and handed over to Works Incident Controller.
- The ambulance will carry the injured to the nearest hospital for treatment.

**4. Personnel/Administrative Officer**

- He should work as a liaison officer liaising with Works Main Controller and other essential departments such as Police, Press and Statutory authorities.
- To ensure that casualties receive adequate attention to arrange additional help if required and inform relatives.
- To control traffic movement into the factory and ensure that alternative transport is available when needed.
- When emergency is prolonged, arrange for the relief of personnel and organize refreshment and catering facilities.
- Arrange for finance for the expenditure to handle the emergency.

**5. Essential Work Team Members**

During emergency the plants immediately affected or likely to be affected, as determined by the Works Main Controller, need to be shut down for safety. In the area immediately affected, it may be possible to isolate equipment from which flammable or toxic material is leaking. This work must be immediately carried out by plant supervisors and essential operators. Workers/staff need to be nominated to carry out the following essential works at the time of emergency:-

- Extra first aid personnel to deal with casualties.
- Emergency engineering works, provision of extra or replacement of light, isolation of equipment, temporary bypass electrical lines etc.
- Moving tankers or other vehicles from area of risk.
- To carry out tests on ambient air quality.
- To act as runner in case of communication system fails.
- The Works Main Controller will require a task force of suitable trained people for the following works:-
  - o Manning of assembly points to record the arrival of evacuated people.
  - o Assistance of casualty arrival areas to record details of casualties.
  - o Manning the factory entrance in liaison with security to direct emergency vehicle containing the gate e.g. ambulance, fire tenders etc.

**The essential work teams are-**

1. Task Force and repair team.
2. Fire fighting team.
3. Communication team.
4. Security Team.
5. Transport Team.
6. First aid and medical team.

Critical Systems / facilities required under the On - Site Emergency Plan

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**Assembly Points**
A Safe Place which is far away from the plant mostly within the Industry premises should be pre-determined as Assembly Point where, in case of emergency, personnel evacuated from the affected areas are to be assembled. The plant workers, contract workers and visitors should assemble in assembly point in case of emergency and the time office clerk should take their attendance so as to assess the missing persons during emergency.

**Alarm System**
Alarm system varies and will depend on the size of the works area -simple fire bell, hand operated siren -break open type, fire alarm etc. Automatic alarm may be needed for highly hazardous nature of plant.

**Communication System**
Communication is a key component to control an emergency. The following communication system may be provided in the plant.

- Walky-Talky.
- Telephone (internal & external).
- Cell phone.
- Intercom/paging.
- Runners (verbal or written messages).

**Siren for Emergency**
Siren for emergency should be different from the normal siren. The emergency siren should be audible to a distance of 5 KM radius. The emergency siren should be used only in case of emergency.

**Escape Route**
The escape route from each and every plant should be clearly marked. The escape route is the shortest route to reach out of the plant area to open area, which leads to assembly point. This route should be indicated on the layout plan attached to the On-site Emergency Plan.

**Evacuation**
All non-essential staff should be evacuated from the emergency site. As soon as the emergency siren rings the workers have to shut down the plant and move to the Assembly

Point. The plant shut down procedure in case of emergency should be prepared and kept ready and responsible persons should be nominated for the purpose.

**Counting of Personnel**
All personnel working in the plant should be counted. Time office persons should collect the details of personnel arriving at the assembly point. These should be checked with the attendances of regular workers and contract workers present in the site on the day of emergency. The accident control should be informed and arrangement should be made for searching missing persons in the emergency affected area. The employee's address, contact number of next to kin should be maintained in the time office so that during emergency relatives of those affected due to emergency may be informed accordingly. Information in respect of emergency should be given to the media and other agency.

**All Clear Signal**
After control of emergency the Works Incident Controller will communicate to the Works Main Controller about the cessation of emergency. The main controller can declare all clear by instructing the time office to sound "All Clear Sirens".

**Mutual Aid System**
Mutual aid scheme should be introduced among industries so that in case of emergency, necessary help from mutual aid partner may be extended. Essential elements of this scheme are-

- Mutual aid must be a written document signed by the Chief Executive of the industries concerned.
- Specify key personnel who are authorized to give requisition of materials from other industries.
- Specify the available quantity of material/equipment that can be spared.
- Mode of requisition during emergency.
- Mode of payment/replacement of material given during an emergency.
- May be updated from time to time based on experience gained.

**Emergency facilities**
The following facilities should be provided in any Industry to tackle any emergency at any time,

- Fire protection and firefighting facilities.
- Emergency lighting and standby power.
- Emergency equipment and rescue equipment

a. Breathing apparatus with compressed air cylinder.
b. Fire proximity suit.
c. Resuscitator.
d. Water gel Blanket.
e. Low temperature suit.
f. First aid kit.
g. Stretchers.
h. Torches.
i. Ladders.

- Personal Protective Equipment (PPE).
- Explosive meter.
- Oxygen and Toxic gas measuring instruments.
- Wind direction indicator.

**CONCLUSIONS**
In this context, we conclude that during the times of On-Site Emergency, the effect of hazards could be controlled and minimized using systematic approach of this On-Site Emergency plan so that the hazard does not spread Off-Site and controlled properly with minimal loss to life, property and environment.

To have better results and effective implementation, the On-Site emergency plan so prepared shall be documented in a printed form in sufficient copies and to be provided to all employees and concerned stakeholders for knowledge, study and easy follow up. Besides the above, it is pertinent that the emergency plan shall be rehearsed and practiced at regular intervals to test efficiency of personnel to improve on the co-ordination between the essential work teams, equipment and to increase confidence and experience to operate such plan. Based on such rehearsal, the plan so prepared should be strengthened by bridging the gaps, if any, and updated annually and uploaded in the factory website for easy reference.

By effectively adhering to the above, all types of accidents could be minimized in the Chemical Industries and thus preventing the damages to life of the individual employees, machineries, properties, environment and the commu-

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nity where the industry is operated.

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